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Children's Understanding of the Distinction Between Literal and Intended Message Meaning

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Language is often marked by a discrepancy between what was *said* and what was *meant*. Learning to recognize that one's intentions may not be clearly articulated is crucial to successful communication. As adults, we are relatively good at recognizing that a message (our own or another's) may not convey the intended meaning. Yet young children's understanding of the distinction between what was said (the literal meaning of the words of the message) and what was meant (the meaning which the speaker intended to convey), despite being the object of a great deal of research, remains somewhat unclear. What isn't known is whether, in trying to distinguish between what was said and what was meant children resort to what they know to be the true state of affairs in the world, the speaker's beliefs about the world (and intention which they attempt to convey through the message), or the wording of the message itself (what was said).

For instance, Robinson, Goelman, & Olson (1983) presented a speaker and a listener with identical arrays of differently coloured flowers. The speaker picked the red flower from his array and then gave the listener an ambiguous message with regard to which flower the speaker wanted the listener to pick. That is, instead of telling the listener to pick the "red flower" the speaker told the listener to pick the "flower". When asked what the speaker had told the listener it was found that 5- to 7-year-old children tended to accept as correct, a description which described the speaker's intended meaning (eg. "red flower") for what had actually been said ("flower"). The explanation for this finding was that children equate what was said with what was meant and "red flower" correctly represents the intent of the speaker (the *intentional* explanation). Bonitatibus (1988) has since replicated and extended the results of Robinson et al. (1983).

However, Robinson and Whitaker (1987) offered an alternative explanation which can be used to make sense of these findings. This explanation can be illustrated by

applying it to the results of Robinson et al. (1983). Perhaps children agreed to any description (flower or red flower) which correctly described the target object (the red flower). This (*congruity*) explanation allows for children choosing either description solely on the basis that each statement correctly describes the flower which the speaker chose, and does not require children to deduce the speaker's meaning and subsequently conflate what was said (flower) with what was meant (*red* flower). Thus, the problem with past research has been that the speaker's intended meaning (eg. red flower) correctly describes the referent (eg. red flower). Given this congruency it is not possible to adjudicate between the two explanations listed above.

Perner, Leekam, and Yuill (1988) have also studied children's understanding of the literal meaning of a message and did so by having a speaker give a listener an ambiguous message. In order to separate the speaker's intention from the meaning of the message, Perner et al. used a situation in which the speaker was led to form a mistaken belief. In this paradigm, a speaker doll put a pencil in a top red cupboard. The pencil was then, in the absence of the speaker, secretly moved to a bottom red cupboard. Next, the speaker returned and told a listener doll (who had no knowledge of either the original or new location) that, "The pencil is in the red cupboard" (an ambiguous message). Subjects were then asked which cupboard the listener would think the pencil was in.

The hypothesis of Perner et al. (1988) was that if children said the listener would think the pencil was in the top red cupboard then they had conflated the ambiguous message with what the speaker had intended (the intentional explanation). The congruity explanation would not be applicable to a finding of this sort because the choice of top red cupboard (where the speaker intended) was different from the actual location of the object (the bottom red cupboard). On the other hand, if subjects chose the bottom red cupboard then they had conflated the message with the true state of affairs in the world (the congruity explanation).

In line with their prediction, Perner et al. (1988) found that 4- and 6-year-old children claimed the listener would think the pencil was in the top red cupboard,

presumably because these children assumed that the speaker's intended and unambiguous meaning was conveyed to the listener despite the ambiguity of the message. In other words, consistent with the results of past research, their findings indicated that children were not able to distinguish between the literal message meaning and the speaker's intended meaning; the speaker's intention was given primacy. Yet, while the procedure of Perner et al. avoided some of the problems of those used in the past, it too had shortcomings. Reviewers pointed out that it was not clear whether children paid any attention to the message whatsoever: children may have answered as they did because they assumed that the listener's belief would be identical to the speaker's even if no message had been offered by the speaker.

A second problem with the procedure of Perner et al. is that the question posed to children was misleading. Children were asked, "Which cupboard does (the listener) think the pencil is in?". The problem with this question is that it implies the listener will think the pencil is in one red cupboard or the other and does not give them an equal opportunity to choose the correct response (that the pencil could be in either one of the red cupboards) given the ambiguity of the mesage. This becomes particulary troublesome in light of the fact that recent research has shown that by 4 years of age a substantial portion of children understand that an ambiguous message restricts another's knowledge, and that by age 5 this understanding is solidly in place (Ruffman, Olson, & Torrance, 1989). If children have attained such an understanding at this early age then why wouldn't they refrain from choosing a particular cupboard and correctly claim the listener will think the chocolate could be in either cupboard? The solution to this problem is, of course, to give children a "think" question which allows them to choose between each of the three alternatives.

In fact, the mere finding that children understand that an ambiguous message is an insufficient source of knowledge suggests that they are capable of differentiating between the speaker's meaning and the literal (ambiguous) meaning of the message. In the experiment of Ruffman et al. (1989) subjects knew where the object was and where the speaker intended the listener to look but still recognized that the listener would not

know which cupboard the chocolate was in.

A recent study by Mitchell and Russell (1989) also helps shed light on this issue. In a series of four experiments, they used a procedure in which the speaker's intended meaning was made discrepant from the message meaning (and thereby avoided the possibility that the congruity explanation would be applicable to their results). A speaker who was said to have either a bad or good memory for an object described the object (eg. a book that said "Reading" on it and had a picture of a dog) and then asked a listener to retrieve it. The listener returned with an object that, while similar, did not exactly match the speaker's description (eg. a book that said "Reading" on it and had a picture of a cat). Subjects were then asked whether this was the object that the speaker had been thinking about (eg. meant). While the results of the first two experiments indicated that 6-year-olds could not distinguish between the literal and intended meaning of a message, Mitchell and Russell argue that the results of the third and fourth experiments indicate that 6-year-olds had attained such an understanding.

There is reason to believe, however, that this conclusion may be premature. In order to understand why we must review their findings. In the third experiment, 6-year-olds, like 10-year-olds, claimed that when the speaker's memory for the object was bad and the listener had returned with a similar but incorrect object, that the found object was the one the speaker had intended. In other words, these children seemed to recognize that while the speaker's message described a slightly different object, because of the speaker's poor memory that description had been mistaken and the found book was actually the book that the speaker had intended. However, unlike the 10-year-olds, 6-year-olds were just as likely to claim that the found book was the one that the speaker had intended when the speaker's memory was good. In this condition subjects were told that "(the speaker) had a really good memory for things, and she could remember perfectly well what her old reading book looked like". If the speaker's memory for the book was so good then why would the found book which differed from the description given by the speaker be the one the speaker had been thinking about. Given that 6-year-olds failed this control condition their responses on the bad memory condition are not

meaningful. It is quite possible that the observed pattern was simply the result of a "Yes bias". That is, subjects may have tended to respond affirmatively whenever they were asked if the found book was the one the listener had been thinking about.

In the fourth experiment subjects were told a story in which a shop assistant referred to a shop manager (who was holding a tin of baked beans) as "The man holding the tin of spaghetti". Subjects were then given either of two reasons for the assistant's incorrect message: (a) "because the shop assistant was *naughty*, she played a *trick*" or (b) "because the shop assistant was *tired*, she got mixed up". Subjects were then asked whether the shop assistant had said the manager was holding a tin of spaghetti on purpose or by accident. It was found that 6-year-olds tended to correctly differentiate the two messages according to whether each had been intentional or unintentional, leading Mitchell and Russell (1989) to conclude that they must have understood that the speaker's intention was discrepant from the message. However, in this experiment there was almost no inference needed to answer correctly. That is, in informing subjects that the assistant was naughty and had played a trick the experimenter had essentially told them (though in different words) that the assistant's message was said on purpose (naughty/trick = on purpose). Likewise, in telling subjects that the assistant was tired and had gotten mixed up, the experimenter had essentially told subjects (in different words) that the assistant's message was given by accident (tired/mixed up = by accident). In the absence of a more stringent design there is no evidence to indicate that 6-year-olds understand that a speaker's intention may be discrepant from their message.

Thus, there is no clear evidence which shows that young children are capable of differentiating between a speaker's intended meaning and the literal meaning of her message. With this in mind, we devised a new procedure based on that of Perner et al. (1988) in which the speaker of an ambiguous message was led to form a mistaken belief (False Belief - Ambiguous condition). However, we modified the procedure of Perner et al. in several ways. First, we gave children a think question which allowed them to choose between three alternatives; that the listener would think the chocolate was in the intended cupboard, the actual cupboard, or that it could be in either cupboard.

Secondly, we included a new condition (Correct Belief - Ambiguous) in order to determine whether children do, in fact, pay attention to the speaker's message when they assess the listener's knowledge. Thirdly, we included a condition in which the speaker uttered an incorrect but unambiguous message (False Belief - Unambiguous). This condition was included as a control for the False Belief - Ambiguous condition to determine whether children were capable of recognizing that one could hold a false belief.

Therefore, the purpose of the first experiment was to determine whether young children are capable of differentiating between the literal and intended meaning of a message. More specifically, we aimed to determine whether, in trying to decipher a speaker's ambiguous message, children resort to the true state of affairs in the world, the speaker's beliefs (intention) about the world, or the wording of the message itself. If they resort to the message itself then they will have demonstrated that they understand that a speaker's intention may be discrepant from the literal meaning of the message.

Method

Subjects

A total of 55 subjects (32 boys, 23 girls) drawn from lower- and middle-class homes participated in this experiment. There were sixteen 4-year-olds (mean age 4-8; range 4-3 to 4-11; 9 boys, 7 girls), sixteen 5-year-olds (mean age 5-7; range 5-1 to 5-11; 10 boys, 6 girls), and twenty-five 6-year-olds (mean age 6-6; range 6-0 to 6-11; 14 boys, 11 girls). All children attended elementary school.

Materials

Materials included three same-sized cupboards (11 cm high x 7 cm wide x 2.5 cm deep). A red and green cupboard were situated beside each other with a second red cupboard above. A male doll (John) served as listener while a female doll (Katy) served as speaker. Each doll was 38 cm tall. A spherical chocolate (1.3 cm in diameter) was used as the object to be hidden in one of the cupboards. A cardboard screen (64 cm high x 44 cm wide) was used as the partition which divided the experimental area from the

(imaginary) playground.

Procedure

Subjects were tested individually in a quiet room seated at a table. As an introduction, children were told that the experimenter had something that was "a bit like a game" and that they would be shown some things and asked some questions. Next, subjects were shown the three cupboards and were asked to say how many red cupboards there were and how many green cupboards there were, after which, they were shown the two dolls and were asked to pretend that they were "real people just like you and me". Table 1 includes a complete description of the procedure from this point on.

Insert Table 1 about here

In each condition the listener went to the "playground", and so, did not see while the speaker put the chocolate in a cupboard. This location depended on the condition. The speaker then joined the listener in the playground and the chocolate was either moved or not moved. The speaker and listener then returned and the speaker gave the listener a message regarding the chocolate's whereabouts.

The first condition (Correct Belief - Ambiguous) was unlike any of Perner et al.'s (1988) and was included to help determine whether children pay attention to the speaker's message, understand ambiguity, and to see if children interpret a message which is based on a *correct* belief according to the speaker's intention. Thus, the speaker first put the chocolate in the top red cupboard, it was not moved, and the speaker's message to the listener regarding the chocolate's location ambiguously referred to "the red cupboard".

The second condition (Correct Belief - Unambiguous) was comparable to the Speaker-Knowledge control condition of Perner et al. (1988) and was included along with the Correct Belief - Ambiguous condition to help determine whether children pay attention to the speaker's message. In this condition, the speaker put the chocolate in

the green cupboard, it was not moved, and the speaker's message to the listener regarding the chocolate's location unmbiguously referred to "the green cupboard". Should children correctly claim that the listener would know which cupboard the chocolate is in under these circumstances, and correctly claim that the listener would not know when the message is correct but ambiguous (Correct Belief - Ambiguous Condition), then it seems clear that they must have payed attention to the speaker's message because all that differs between the two conditions is the location of the chocolate and the speaker's message.

Furthermore, the Correct Belief - Unambiguous condition acts as a control for the Correct Belief - Ambiguous condition; correct performance on both indicates an understanding that an ambiguous message is an insufficient source of knowledge. That is, when considering whether children understand ambiguity it is necessary to exclude those who fail the Correct Belief - Unambiguous condition because it is not clear whether these children base their attributions of ignorance to the other in the Correct Belief - Ambiguous condition on the fact that the speaker's message is ambiguous, or the fact that the listener was absent when the chocolate was placed in the cupboard. In contrast, those who pass the Correct Belief - Unambiguous condition recognize that the listener will know which cupboard the chocolate is in despite the fact that the listener had been absent when the the speaker placed it in a cupboard. Therefore, these children understand that the listener's absence, by itself, is not enough to induce ignorance unless the message is ambiguous. Thus, if children pass both Correct Belief conditions they must base their attributions of ignorance to the other in the ambiguous condition on the fact that the speaker's message is ambiguous. Furthermore, this would also show that they are able to distinguish the literal meaning of a message from the speaker's intended meaning.

The third condition (False Belief - Ambiguous) was comparable to the experimental condition of Perner et al. (1988) and was included to see if children interpret a message which is based on a *false* belief according to the speaker's intention. In this condition, the speaker put the chocolate in either the top red cupboard or the

bottom red cupboard, the chocolate was then (unknown to the speaker and listener) moved to the opposite red cupboard, and the speaker's message to the listener regarding the chocolate's location ambiguously referred to "the red cupboard". The choice of initial red cupboard, in contrast to the Correct Belief - Ambiguous condition (where the chocolate was always placed in the top red cupboard), was counterbalanced in order to control for the possibility that subjects' judgments of where the listener would think the chocolate was, were not based on the location of the chocolate in previous conditions.

As discussed earlier, the value of this condition lies in the fact that it avoids the problems of earlier research by separating the intended referent (eg. the top red cupboard where the speaker meant the listener to look) from the actual location (eg. the bottom red cupboard). The hypothesis was that if children said the listener would think the chocolate was in the red cupboard that the speaker had meant him to look in, then they had conflated the message with what had been meant by assuming that the speaker's meaning would be unambiguously conveyed to the listener despite the ambiguity of the message. On the other hand, if subjects chose the bottom red cupboard then they had conflated the message with the true state of affairs in the world, that is, where the chocolate really was. Finally, if subjects chose the "either cupboard" response then they would have clearly demonstrated their understanding of the distiction between literal and intended meaning.

Finally, the fourth condition (False Belief - Unambiguous), like the first condition, was unlike any of Perner et al.'s (1988) and was included as a control for the two Ambiguous conditions. In the False Belief - Unambiguous condition the speaker put the chocolate in the green cupboard, the chocolate was then (unknown to the speaker and listener) moved to the bottom red cupboard, and the speaker's message regarding the chocolate's location unambiguously referred to "the green cupboard". This condition provides a means of determining whether children understand that one may hold a false belief. Research has shown that it is not until age 4 that children begin to recognize that one's beliefs may be discrepant from reality (Hogrefe, Wimmer, & Perner, 1986; Moses & Flavell, 1989; Perner, Leekam, & Wimmer, 1987; Wimmer & Perner, 1983). Prior to this

time children are capable only of assigning beliefs to others which they know to be true or are at least potentially true. If subjects are capable of recognizing that one may hold a false belief then they should recognize that the listener, like the speaker, will think the object is in the green cupboard (because this is where the speaker's message has unambiguously referred). Because the two ambiguous conditions also required children to understand false belief for results to be valid (otherwise children would always claim the listener would think the chocolate was in cupboard where they knew it to be), success on the False Belief - Unambiguous condition was used as the criterion for inclusion in the analysis.

Design

The order in which subjects received the four conditions was counterbalanced across subjects (two orders). The order in which children received the know and think questions was also counterbalanced across subjects (two orders), as were the choices of "bottom red", "top red", and "either", and of "bottom red", "top red", and "green" (see Table 1) in the different forms of the *think* question (six orders). Counterbalancing was carried out such that any potential between variables effects would have been balanced across subjects.

Results and Discussion

Control Question. - The data for 16 subjects (ten 4-year-olds, one 5-year-old, and four 6-year-olds) was excluded from the analysis (unless noted otherwise) because they failed the False Belief - Unambiguous control condition. The remaining sample consisted of 42 subjects (24 boys, 18 girls), comprised of six 4-year-olds (mean age 4-8; range 4-3 to 4-11; 3 boys, 3 girls), fifteen 5-year-olds (mean age 5-7; range 5-1 to 5-11; 9 boys, 6 girls), and twenty-one 6-year-olds (mean age 6-5; range 6-0 to 6-11; 12 boys, 9 girls). Having passed the control, these children were, for the most part, considered as a single group in the analysis.

Order Effects. - Children's responses to the *think* questions in the two Ambiguous conditions were subjected to a 2 (condition order) x 2 (order of know think questions) x 2 (location of chocolate in False Belief - Ambiguous condition) loglinear analysis. There were no significant effects. Also recall that three options were included with each think question and that there were six orders for these options. Because there were too few subjects to include this variable in the loglinear analysis, it was analyzed as a main effect. A chi-square analysis revealed that there was not a significant effect for the order of think question options. For the same reason, sex was analyzed as a main effect and a chi-square analysis revealed no significant effect.

Reminder Questions. - Every child passed all reminder questions for the critical False Belief - Ambiguous condition, and only one child (a 4-year-old) failed a reminder question for the remaining three conditions. Because children were corrected after erring on the reminder questions, this child was not excluded from the subsequent analysis.

Experimental Questions

Table 2 shows the correct answers to the know and think questions.

Insert Table 2 about here

Know Questions. - The vast majority of children were correct in asserting that the listener would not know the location of the chocolate in both Ambiguous conditions. In the False Belief - Ambiguous condition, 93% of children responded in this manner and in the Correct Belief - Ambiguous condition this figure was 91%. There are two reasons why children could have responded in this manner. First, they may have recognized that because the speaker's message was ambiguous the listener would not know which cupboard the chocolate was in. On the other hand, subjects may not have understood the implications of the speaker's ambiguous message and instead claimed that the other would not know because the other had been absent when the chocolate was placed in the box.

In order to decide which of these two strategies children used when answering the know question we must turn to their responses in the Correct Belief - Unambiguous condition. Recall that in this condition the object was placed in the green cupboard, was not moved, and the speaker's message unambiguously referred to the green cupboard. Thus, those who passed the Correct Belief - Unambiguous condition understood that the listener's absence, by itself, was not enough to induce ignorance unless the message was also ambiguous. Of those who passed the Correct Belief - Unambiguous condition, 3 of 3 (100%) 4-year-olds, 10 of 13 (77%) 5-year-olds, and 20 of 20 (100%) 6-year-olds, also passed the Correct Belief - Ambiguous condition. Overall, of the subjects who failed the False Belief - Unambiguous control condition yet passed the Correct Belief - Unambiguous condition, 5 of 8 (63%) 4-year-olds, 10 of 13 (77%) 5-year-olds, and 22 of 23 (96%) 6-year-olds, also passed the Correct belief - Ambiguous condition. These children clearly seemed to understand that an ambiguous message was an insufficient source of knowledge. Thus, they seemed capable of distinguishing between the location they knew the speaker meant the listener to look in (the top red cupboard) and the literal (ambiguous) meaning of the message. In fact, the pattern for those who failed the two Unambiguous message conditions was much the same. Of this group, 10 of 11 (91%) claimed that the listener would not know the location of the chocolate in the Correct Belief - Ambiguous condition. Once again, however it is not clear whether these children can distinguish intended from literal meaning because it isn't clear whether they understand ambiguity.

Our finding, that about half the 4-year-olds and most 5- and 6-year-olds understand that an ambiguous message is an insufficient source of knowledge, is consistent with the finding of Ruffman et al. (1989), but indicates that children's understanding of lexical ambiguity is attained at least one year earlier than than past research (Beal & Flavell, 1984; Perner et al., 1988; Robinson et al., 1983; Sodian, 1988) has indicated. It could be argued that when the cues are made as salient as they were in this study children have essentially been given the answers to the questions and that this is, therefore, not a true test of their understanding of ambiguity. However, as

Ruffman et al. (1989) argue, there are two reasons for thinking otherwise.

First, while the task employed in this experiment did undoubtedly make things easier for children by highlighting and clarifying relevant information, they still could not provide the correct answers to the knowledge questions without an understanding (a) that this information was, in fact, ambiguous, and (b) how ambiguous information leads to a lack of knowledge. In effect, we reduced the ambiguity (that is, the implicitness) of the procedure itself, yet still required children to recognize ambiguous information as ambiguous information and to understand its relation to knowledge. A parallel situation can be found in the False Belief - Unambiguous condition of the present experiment. In order to predict that the listener will hold a false belief it is not enough merely to recognize that the listener had not seen the chocolate moved. While all 4-year-olds recognized that the other had not seen the object transferred to the bottom red cupboard, and while the speaker's message claiming the chocolate was in the green cupboard was repeated either 3 or 4 times before the think question was asked (depending on whether the think question was asked first), most (57%) 4-year-olds still claimed the listener would think the chocolate was in the bottom red cupboard and only 43% recognized that the other would think the chocolate was in the green cupboard. What these children seem to lack is a conceptual (metarepresentational) understanding of the way in which the perceptual information leads to the false belief. Similarly, being reminded that there are two red cupboards is without benefit unless children understand how this will effect the informativeness of the message (that it will make the message ambiguous).

Secondly, if the cues we provided children with were overinformative, leading them to the correct answer without having to recognize the implications of the cues, then shouldn't more or even all subjects have correctly assessed the other's knowledge? Perhaps it is equally significant not only that many 4- and 5-year-olds do seem to understand ambiguity, but that more 4-year-olds cannot solve these tasks despite efforts to make them as easy as possible. Clearly, these children are simply incapable of taking advantage of the relevant perceptual information when judging another's mental state.

Think Questions. - If children understand that the literal (ambiguous) meaning of

a message will prevent the listener from knowing which cupboard the chocolate is in despite the speaker's intention to convey her meaning to the listener, then when asked the think question they might be expected to respond that the listener would think the chocolate could be in either red cupboard (the response which clearly indicates a distinction between literal and intended meaning). However, Table 3 shows that in the ambiguous conditions very few children chose the "either" response.

Insert Table 3 about here

Recall that we had claimed the think question used by Perner et al. (1988) was misleading and had, therefore, modified it so that children would be given an equal opportunity of choosing the correct response, "either cupboard". However, despite being given this help there was still an overwhelming tendency to choose a particular cupboard. What is of interest, then, is whether the children who chose a cupboard tended to claim the listener would think the chocolate was in the intended cupboard or whether they would choose the non-intended cupboard. Table 3 shows that in the False Belief - Ambiguous condition there was a strong tendency among children of all age groups to choose the cupboard which the speaker falsely believed the chocolate was in and intended the listener to look in. When subjects are taken as a group, this tendency was significantly different from chance, $^{2}_{(1,\ \underline{N}\ =\ 42)} = 3.95$, $p < .05$. Once again, because the chocolate was not in the intended cupboard but was actually in the opposite red cupboard the congruity explanation does not apply. That is, subjects did not simply agree to a description which correctly represents the location of the chocolate because the location most subjects chose was opposite to the actual location. This result is also consistent with that of Perner et al. (1988), and suggests that subjects chose the intended cupboard because they inferred what the speaker meant when she uttered her ambiguous message "red cupboard", and then attributed this understanding to the listener.

Further, while it was not clear whether children in the study of Perner et al.

(1988) even took the speaker's message into account. The results of Experiment 1 suggest that children did so. Of the children who said that the listener would think that the chocolate was in the intended cupboard, 2 of 4 (50%) 4-year-olds, 7 of 10 (70%) 5-year-olds, and 14 of 14 (100%) 6-year-olds correctly claimed that the listener would not know which cupboard the chocolate is in when the speaker's message was ambiguous (Correct Belief - Ambiguous condition), yet correctly claimed that the listener would know when the message was unambiguous (Correct Belief - Unambiguous condition). The most common error for those who did not pass both conditions was to claim the listener would not know in the unambiguous condition (because he had been absent when the chocolate had been placed in the cupboard). Thus, although the answer pattern for this group of 4-year-olds does not provide clear evidence that children do, in fact, pay attention to the speaker's message, the data for the 5- and 6-year-olds does seem to clearly indicate that these children must have payed attention to the speaker's message because all that differs between the two Correct Belief conditions is the location of the chocolate and the speaker's message. Therefore, even children who clearly listened to the speaker's message and based their assessments of the listener's knowledge on this message, still tended to respond that the listener would think the chocolate was in the intended cupboard, suggesting the possibility that children were, in fact, conflating what had been said with what had been meant.

On the other hand, it could be argued that subjects' choice of the intended cupboard does not indicate that they conflate the speaker's meaning with the literal meaning of the message, but instead, that children chose this cupboard because they recognized that the other would not know which cupboard the chocolate was in, and chose the intended cupboard because it was the cupboard where the chocolate was not. In order to decide whether subjects answered in either of these two ways we must turn to the Correct Belief - Ambiguous condition. Recall that in this condition the chocolate was placed in the top red cupboard, was not moved, and the speaker's message to the listener ambiguously referred to the red cupboard. If subjects choice of cupboard is motivated by a preference for the cupboard where the chocolate is not, then there should have been a

tendency on the part of subjects to choose the bottom red cupboard because this is the location which is consistent with the recognition that the listener does not know which cupboard the chocolate is in.

Table 3 shows that in the Correct Belief - Ambiguous condition, children's responses were about equally divided between the top and bottom red cupboard. Thus, there was not a tendency for children to choose the location where the pencil was not. On the other hand, it is possible that subjects' choice of cupboard was motivated by two factors which worked in combination: (a) their knowledge that the listener did not know where the chocolate was, and (b) their preference for choosing the cupboard where the speaker intended the listener to look. Thus, in the False Belief - Ambiguous condition subjects may have chosen the intended cupboard because it satisfies both of these criteria. In the Correct Belief - Ambiguous condition subjects responses may have been split evenly between the two cupboards because choosing either cupboard satisfies only one of the two criteria.

The discrepancy between subjects' answers to the know and think questions is at first glance quite puzzling. While almost all children claimed the listener would not know the location of the chocolate in both Ambiguous conditions, very few recognized that the listener would think the chocolate could be in either red cupboard. Why would children who understand that the listener will not know which cupboard the chocolate is in in the Ambiguous conditions, still claim that the listener will think the chocolate is in a particular cupboard rather than correctly claiming that the listener will think the chocolate could be in either cupboard?. One possibility is that children believe that the speaker's meaning somehow gets through to the listener even though they recognize the ambiguity of the message. Another possibility is that children do not fully understand the modal expression "could" and its referent "either". A third possibility is that children recognized that "either" was the correct response but chose the cupboard which they thought the listener would be most likely to look in if he had to choose one or the other.

It is also possible that a semantic difference between *know* and *think* was

responsible for this pattern. *Know* is an expresssion of certainty so that there was only one correct answer to this question. When asked whether the listener would know, most children took into account either the ambiguous nature of the message or the other's absence when the chocolate had been placed in the box, and correctly concluded that he could not know. To conclude that the listener would have known under these circumstances, would have been obviously wrong. However, because *think* can be used as an expression of uncertainty, there were a number of potentially correct answers to this question. When asked where the listener would think the chocolate was, children may have recognized that although he wouldn't really know which cupboard the chocolate was in, he would have thought it was in one of the two red cupboards (given that the speaker's message had named the "red cupboard" as the location). While the "either cupboard" response might be considered *more* correct, a choice of one of the two red cupboards is not incorrect. Thus, while the know question did not give children the opportunity to judge between the literal and intended meaning of the message and still be correct (to be correct they had to give primacy to the message meaning), the think question allowed children to choose between these two meanings and still be correct (or at least potentially correct). Children's responses to the think question indicated that when given this opportunity, there was a significant tendency to give primacy to the intended meaning.

Think Justifications. - Children's justifications to the think question, particulary those which make reference to the speaker having mentioned a particular cupboard, are helpful in deciding whether children's choice of the intended cupboard in the False Belief - Ambiguous condition is indeed representative of a tendency to conflate intended and literal message meaning. Table 4 includes this data and is based on the justifications of all children who passed the False Belief - Unambiguous condition, regardless of their answer to the think question.

Insert Table 4 about here

As Table 4 shows, 19% of subjects gave a justification which referred to the speaker having mentioned a particular cupboard. When the subjects who did not respond or answered "I don't know" to the justification question are excluded from this analysis, this figure rises to 22%. The last class of justification is particularly surprising in light of the fact that the speaker's message had been repeated either three or four times (depending on whether the know or think question came first), and that each time the phrase "red cupboard" had been emphasized. It might be expected that only those children who failed to understand that an ambiguous message restricts a listener's knowledge would give justifications of this nature. However, when only the data for those subjects who understood ambiguity are considered, it was still the case that 16% of subjects (18% when those who failed to answer or who answered "don't know" are excluded) made reference to the speaker having mentioned a particular cupboard.

Experiment 1: Summary - On the one hand, children's responses to the know questions of Experiment 1 seem to indicate that by 5 or 6 years of age, they recognize that the literal meaning of a message may be discrepant from the intended meaning. On the other hand, many subjects, when given the opportunity to judge between the literal and intended meaning of the message, gave primacy to the intended meaning (as their responses to the think question indicate). Semantic differences related to the degree of certainty or uncertainty entailed by the verbs "know" and "think" may be responsible for this pattern. This tendency was again seen on the justification question where some children clearly conflated what was said with what was meant.

Experiment 2

The results of the first experiment suggested that children may conflate what was said with what was meant when the speaker's message is based on a false belief but not when it is based on a correct belief. It is possible that salience played a role in producing this pattern. In the False Belief conditions, unlike the Correct Belief conditions, subjects clearly enjoyed that the speaker had been tricked and this enjoyment likely made the

speaker's belief more salient. Thus, in order to get a better idea of the role salience plays in subjects' assessments of the listener's knowledge and beliefs, we made the speaker's belief more salient in the second experiment. Consequently, in Experiment 2, we included the same four conditions as in Experiment 1 but asked subjects which cupboard the *speaker* thought the chocolate was in before asking them which cupboard the *listener* would think the chocolate was in.

Method

Subjects

A total of 51 subjects (26 boys, 25 girls) drawn from lower- and middle-class homes participated in this experiment. There were sixteen 4-year-olds (mean age 4-9; range 4-6 to 4-11; 11 boys, 5 girls), sixteen 5-year-olds (mean age 5-6; range 5-1 to 5-11; 6 boys, 10 girls), and nineteen 6-year-olds (mean age 6-7; range 6-0 to 7-2; 9 boys, 10 girls). All children attended elementary school.

Materials

The same materials used in Experiment 1 were used in Experiment 2.

Procedure

Besides reminding subjects of the speaker's belief before asking them which cupboard the listener would think the chocolate was in, the procedure for the four conditions of Experiment 2 differed from that of Experiment 1 in that the reminder questions were altered slightly, a justification question was not asked following the know question, and the know question always preceded the think question. This latter change was made because children's responses to the think question in Experiment 1 were not significantly effected by changes to the order in which they received the know and think questions, and to make sure that subjects were not misled by the speaker's belief (see below). Table 5 includes a complete description of the procedure used in the second experiment.

Insert Table 5 about here

In order to preserve the salience of the speaker's belief yet prevent this belief from misleading children, subjects were asked whether the listener had seen where the speaker had put the chocolate, and then whether the other would know where the chocolate was, immediately after the question regarding the speaker's belief and before being asked the think question regarding the listener's belief. Furthermore, in order to be sure that subjects' responses were based on a clear understanding of the procedure, they were given a summary of events that had taken place to that point before being asked the think question. The experiment was carried out in a quiet room and introduced as a game just like in Experiment 1. Furthermore, the cupboards and dolls were introduced to children just as in Experiment 1. Table 5 includes a complete description of the procedure from this point on.

Design

The design was identical to that of Experiment 1 with the exception that, as mentioned, the know question was always asked before the think question in this experiment. Counterbalancing was carried out as in the first experiment.

Results and Discussion

Control Question. - The data for 12 subjects (six 4-year-olds, three 5-year-olds, and three 6-year-olds) was excluded from the analysis (unless noted otherwise) because they failed the False Belief - Unambiguous control condition. The remaining sample consisted of 39 subjects (22 boys, 17 girls) comprised of ten 4-year-olds (mean age 4-8; range 4-6 to 4-10; 9 boys, 1 girl), thirteen 5-year-olds (mean age 5-5; range 5-1 to 5-11; 5 boys, 8 girls), and sixteen 6-year-olds (mean age 6-7; range 6-0 to 7-1; 8 boys, 8 girls). Having passed the control, these children were, for the most part, considered as a single group in

the analysis.

Order Effects. - Children's responses to the *think* questions in the two Ambiguous conditions were subjected to a 2 (condition order) x 2 (sex) x 2 (location of chocolate in False Belief - Ambiguous condition) loglinear analysis, and revealed a significant main effect in the False Belief - Ambiguous condition for condition order, $^{2}_{(1, N = 37} = 5.28$, $p < .05$. This effect, which we will no try to interpret, took the form of subjects who had been given the False Belief - Ambiguous condition before the Correct Belief - Ambiguous condition being slightly more likely to claim that the listener would think the object was in the intended cupboard. Because there were too few subjects to include the think question/options variable in the loglinear analysis, it was analyzed as a main effect. A chi-square analysis revealed that there was not a significant effect for the order of think question options.

Reminder Questions. - Every child passed all reminder questions for all four conditions.

Experimental Questions

Know Questions. - The majority of children were correct in asserting that the listener would not know the location of the chocolate in both Ambiguous conditions. In the False Belief - Ambiguous condition, 87% of children responded in this manner and in the Correct Belief - Ambiguous condition this figure was 85%. Of the children who passed the Correct Belief - Unambiguous condition, 7 of 9 (78%) 4-year-olds, 9 of 10 (90%) 5-year-olds, and 10 of 11 (91%) 6-year-olds, also passed the Correct Belief - Ambiguous condition. Overall, of the subjects who failed the False Belief - Unambiguous control condition yet passed the Correct Belief - Unambiguous condition, 7 of 13 (54%) 4-year-olds, 11 of 12 (92%) 5-year-olds, and 11 of 13 (85%) 6-year-olds, also passed the Correct belief - Ambiguous condition. These children clearly seemed to understand that an ambiguous message was an insufficient source of knowledge. Consequently, they seemed capable of distinguishing between the location they knew the speaker meant the listener to look in (the top red cupboard) and the literal (ambiguous) meaning of the message. In fact, the pattern for those who failed the two Unambiguous message

conditions was much the same. Of this group, 11 of 13 (85%) claimed that the listener would not know the location of the chocolate in the Correct Belief - Ambiguous condition. Once again, however it is not clear whether these children can distinguish intended from literal meaning because it isn't clear whether they understood ambiguity.

Thus, the results of this experiment are consistent with those of the first experiment and, contrary to a large body of past research, indicate that children begin to understand that an ambiguous message is an insufficient source of knowledge around age 4, and that this understanding is solidly in place by age 5.

Think Questions. - Table 6 includes children's responses to the think questions for the two ambiguous conditions.

Insert Table 6 about here

As Table 6 shows, despite subjects' correct responses to the know question, there again were very few subjects who chose the correct response "either cupboard" to the think question in the ambiguous conditions. Furthermore, there again was a very strong tendency for subjects to choose the intended cupboard in the False Belief - Ambiguous condition. In fact, this tendency was even stronger than that obtained in the first experiment, and was highly significant, $^{2}_{(1, N = 37} = 13.43$, $p < .001$. In the Correct Belief - Ambiguous condition, while more subjects chose the intended cupboard than the non-intended cupboard and the proportion of subjects choosing the intended cupboard did increase in comparison to Experiment 1, the number of subjects choosing the intended cupboard in relation to the nonintended cupboard was not significantly different from chance. Thus, the results of this experiment suggest that by increasing the salience of the speaker's belief subjects were made more likely to choose the cupboard which the speaker would have meant the listener to look in, and that salience may be an important factor for obtaining a result of this nature. In addition, because in the Correct Belief - Ambiguous Condition children did not tend to choose the cupboard where the chocolate was not (see Table 6: non-intended cupboard), subjects' tendency to choose the

intended cupboard in the False Belief - Ambiguous condition cannot be explained solely in these terms either.

In order to determine whether subjects were paying sufficient attention to the speaker's message when they claimed the listener would think the chocolate was in the intended cupboard in the False Belief - Ambiguous condition, we must turn to their responses to the know questions in the two Correct Belief conditions. Of this group, 6 of 8 (75%) 4-year-olds, 8 of 12 (67%) 5-year-olds, and 7 of 13 (54%) 6-year-olds correctly claimed that the listener would not know which cupboard the chocolate is in when the speaker's message was ambiguous (Correct Belief - Ambiguous condition), yet correctly claimed that the listener would know when the message was unambiguous (Correct Belief - Unambiguous condition). These results present a pattern which is opposite to that obtained in Experiment 1. While in the first experiment it seemed clear that 6-year-olds were paying attention to the message but unclear whether 4-year-olds were doing so, in the second experiment, 4-year-olds give greater evidence of having payed attention to the message than 5- and 6-year-olds. The problem in Experiment 2 was that a substantial number of 6-year-olds claimed the listener would not know when the message was unambiguous (because he had not seen which cupboard the chocolate had been placed in). These children allowed one perceptual cue (the other's absence) to outweigh a second cue (that the message was informative). This contradiction between results confuses matters. On the basis of the first two experiments it cannot be said for certain whether children who chose the intended cupboard did, in fact, pay attention to the speaker's message; the results of this second experiment suggest the possibility subjects who choose the intended cupboard are not paying sufficient attention to the speaker's message.

Think Justifcations. - One final result of the second experiment concerns children's justifications following think questions. Table 7 includes this data and is based on the justifications of all children who passed the False Belief - Unambiguous condition, regardless of their answer to the think question.

Insert Table 7 about here

As can be seen, a large proportion (33%) of children gave justifications which made reference to the speaker having mentioned the intended cupboard. Furthermore, these mistakes occurred despite the fact that the speaker's message had been repeated four times and that each time the phrase "red cupboard" had been emphasized. When the subjects who did not respond or answered "I don't know" to the justification question are excluded from the analysis, this figure rises to 37%. When only the data for those subjects who understood ambiguity are considered, it was still the case that 30% of subjects (35% when those who failed to answer or who answered "don't know" are excluded) made reference to the speaker having mentioned a particular cupboard. As was the case for the think questions, the justifications given in this experiment (in relation to Experiment 1) are indicative of a greater tendency to conflate what was said with what was meant, and suggest that the increased salience of the speaker's belief may play a role in this regard.

Experiment 2: Summary. - Children's performance on the know questions of this experiment again shows that by five years of age children are capable of distinguishing between the literal meaning of a message and the speaker's intended meaning. Furthermore, their performance on the think question again shows that in a situation which allows them to judge between intended and literal meaning they give primacy to the speaker's meaning, although it is not clear in this experiment whether children were paying sufficient attention to the speaker's message. In addition, the results of Experiment 2 suggest that when the speaker's belief is highly salient the tendency to conflate intended and literal meaning is even greater.

Experiment 3

In Experiment 2, it was not clear whether children had payed sufficient attention to the speaker's message. Thus, in Experiment 3 we included a condition (the False Belief - Unambiguous Misleading Message condition) that was identical in every way to the False Belief - Ambiguous condition used in Experiment 2 except that the speaker's message to the listener was misleading. The Misleading Message condition was also used in place of the False Belief - Unambiguous condition as a control condition to guage children's understanding of false belief. The three remaining conditions used in Experiment 1 and 2 were again used in Experiment 3.

In the Misleading Message condition the listener was in the playground while the speaker placed the chocolate in either the top or bottom red cupboard (the choice of cupboard was again counterbalanced between subjects). The speaker then went to the playground and in her absence the experimenter moved the chocolate to the opposite red cupboard. Then when the speaker and listener returned, the listener asked where his chocolate was and the speaker replied, "The chocolate is in the green cupboard". In order to draw attention to the misleading nature of the speaker's message, subjects were informed both before and after the message that it was a lie. If children do pay attention to the speaker's message then they should recognize that the listener will think the chocolate is in the green cupboard where the speaker unambiguously indicated it was. If, on the other hand, children ignore the speaker's message and believe the speaker's belief is transmitted to the listener even if no message had been offered by the speaker, the argument raised by critics of Perner et al. (1988), then they should claim the chocolate is in the intended cupboard.

In order to determine when children begin to stop conflating what was said with what was meant, we also included a group of grade 3 children whose average age was about 9 years as subjects (rather than 4-year-olds).

Method

Subjects

A total of 56 subjects (31 boys, 25 girls) drawn from lower- and middle-class homes participated in this experiment. There were sixteen 5-year-olds (mean age 5-7; range 5-0 to 5-11; 10 boys, 6 girls), sixteen 6-year-olds (mean age 6-7; range 6-1 to 7-1; 7 boys, 9 girls), and twenty-four 9-year-olds (mean age 9-1; range 8-3 to 9-7; 14 boys, 10 girls). All children attended elementary school.

Materials

The same materials used in Experiment 1 and 2 were used in Experiment 3.

Procedure

The conditions of Experiment 3 followed the same general procedure as those used in Experiment 2 except that a check question was included at the end of each condition to ensure that subjects had not been confused by the elaborate design of the conditions in previous experiments, and had lost track of the sequence of events and location of the chocolate despite our efforts to make cues as salient as possible. If subjects had lost track of this information, then their choice of cupboard when asked the think question would not accurately reflect their beliefs about the listener's belief. Thus, the experimenter asked subjects to, "Show me where the chocolate is". Other than including this question and replacing the False Belief - Unambiguous condition with the False Belief - Misleading Unambiguous Message condition, the procedure used in Experiment 3 was identical to that used in Experiment 2.

Results and Discussion

Control Question. - The data for 10 subjects (five 5-year-olds, four 6-year-olds, and one 9-year-old) was excluded from the analysis (unless noted otherwise) because they failed the False Message condition. The remaining sample consisted of 46 subjects (25

boys, 21 girls) comprised of eleven 5-year-olds (mean age 5-7; range 5-0 to 5-11; 7 boys, 4 girls), twelve 6-year-olds (mean age 6-7; range 6-1 to 7-1; 5 boys, 7 girls), and twenty-three 9-year-olds (mean age 9-0; range 8-3 to 9-7; 13 boys, 10 girls). Having passed the control, these children were, for the most part, considered as a single group in the analysis.

Order Effects. - Children's responses to the *think* questions in the two Ambiguous conditions were subjected to a 2 (condition order) x 2 (sex) x 2 (location of chocolate in False Belief - Ambiguous condition) loglinear analysis. There were no significant effects. Because there were too few subjects to include the think question/options variable in the loglinear analysis, it was analyzed as a main effect. A chi-square analysis revealed that there was not a significant effect for the order of think question options.

Reminder Questions. - Every child passed all reminder questions for all four conditions. In addition, all children passed the "Show me" check question asked at the end of each condition, indicating that they had no trouble keeping track of the location of the object.

Experimental Questions

Know Questions. - Almost all children (98%) were correct in asserting that the listener would not know the location of the chocolate in each of the Ambiguous conditions. Of the children who passed the Correct Belief - Unambiguous condition, 9 of 10 (90%) 5-year-olds, 9 of 9 (100%) 6-year-olds, and 22 of 22 (100%) 9-year-olds, also passed the Correct Belief - Ambiguous condition. Overall, including subjects who failed the False Message condition, of those who passed the Correct Belief - Unambiguous condition, 11 of 13 (85%) 5-year-olds, 11 of 12 (92%) 6-year-olds, and 23 of 23 (100%) 9-year-olds, also passed the Correct Belief - Ambiguous condition. It seems clear that these children understood that an ambiguous message is an insufficient source of knowledge, and that they were capable of distinguishing between the location they knew the speaker meant the listener to look in (the top red cupboard) and the literal (ambiguous) meaning of the message. In fact, as in the first two experiments, the pattern for those who failed the Correct Belief - Unambiguous condition was much the

same. Of this group, 8 of 8 (100%) claimed that the listener would not know the location of the chocolate in the Correct Belief - Ambiguous condition.

Thus, the results of the three experiments are very consistent and indicate that by 5 years of age children understand that an ambiguous message is an insufficient source of knowledge, at least one year before a large body of previous research has indicated.

Think Questions. - The main question tested by this experiment was how children who clearly payed attention to the speaker's message in the Misleading Message condition would fare on the two Ambiguous conditions. Most children (11 of 16 {69%} 5-year-olds, 12 of 16 {75%} 6-year-olds, and 23 of 24 {96%} 9-year-olds) passed the Misleading Message condition by recognizing that the listener would think the chocolate was where the speaker falsely claimed it to be. Table 8 includes the data of the subjects who passed the Misleading Message condition, and shows that ver few 5- and 6-year-olds, but about half the 9-year-olds chose the "either" response to the think question.

Insert Table 8 about here

Table 8 also shows that in the False Belief - Ambiguous condition, despite the fact that children clearly payed attention to the speaker's message, the vast majority claimed the listener would think the chocolate was in the intended cupboard rather than the non-intended cupboard. This result was again significant, both for the 6-year-old group, $^{2}_{(1, N = 11} = 4.41$, $p < .05$, and for all children taken as a whole, $^{2}_{(1, N = 34} = 9.68$, $p < .01$. Furthermore, the magnitude of this tendency was very similar to that obtained in Experiment 2 (where like Experiment 3, the speaker's belief was made more salient) and somewhat greater than that obtained in Experiment 1 (where the speaker's belief was not made particularly saient). Thus, the results of the three experiments together suggest that when the speaker's belief is made more salient, there is a greater tendency to conflate what was said with what was meant.

Further evidence that children payed attention to the message comes from their

responses to the know questions of the two Correct Belief conditions. Of the children who responded that the listener would think the chocolate is in the intended cupboard, 7 of 9 (78%) 5-year-olds, 8 of 11 (73%) 6-year-olds, and 10 of 11 (91%) 9-year-olds, claimed the listener would know which cupboard the chocolate was in when the message was correct and unambiguous, and wouldn't know when the message was correct but ambiguous. This pattern is consistent with that obtained in the first experiment and suggests that the pattern obtained in the second experiment (in which a substantial proportion of 6-year-olds incorrectly claimed the listener would not know when the message was correct and unambiguous) was anomalous. At any rate, the results of this experiment provide clear evidence that children do listen to the speaker's message.

In addition, Table 8 shows that in the Correct Belief - Ambiguous condition there was only a moderate tendency to choose the intended cupboard. Once again, the reason for the discrepancy between this condition and the False Belief - Ambiguous condition may stem from an interaction between two factors: (a) subjects' knowledge that the listener did not know where the chocolate was, and (b) their preference for choosing the cupboard where the speaker intended the listener to look. Thus, whereas in the False Belief - Ambiguous condition subjects may have chose the intended cupboard because it satisfies both of these criteria, in the Correct Belief - Ambiguous condition subjects responses may have been more evenly split between the two cupboards because choosing either of the two cupboards satisfies only one of the two criteria. Furthermore, because in the Correct Belief - Ambiguous Condition children did not tend to choose the cupboard where the chocolate was not (see Table 8: non-intended cupboard), subjects' tendency to choose the intended cupboard in the False Belief - Ambiguous condition cannot be explained solely in these terms either.

Think Justifications. - Table 9 includes includes the think justifications which made reference to the speaker having mentioned a particular cupboard, and is based on the justifications of all children who passed the False Message condition regardless of their answer to the think question.

Insert Table 9 about here

As can be seen a large proportion of children (30%) again gave justifications of this type. Furthermore, these mistakes occurred despite the fact that the speaker's message had been repeated four times and that each time the phrase "red cupboard" had been emphasized. When the subjects who did not respond or answered "I don't know" to the justification question are excluded from the analysis, this figure rises to 34%. Furthermore, all children who gave justifications of this nature passed both Correct Belief conditions indicating they understood that an ambiguous message retricts knowledge. Thus, the justification data clearly indicate a tendency to conflate what was said with what was meant despite our efforts to make the message as unforgettable as possible. Furthermore, as was the case for the think questions, the justifications given in this experiment (in relation to Experiment 1) are indicative of a greater tendency to conflate what was said with what was meant, and suggest that the increased salience of the speaker's belief may play a role in this regard.

General Discussion

The results of these three experiments, (in particular, children's responses to the knowledge questions), indicate that many 4-year-olds and most 5- and 6-year-olds understand that a spoken message is sometimes an insufficient means of communicating a speaker's intention. In other words, they are able to distinguish between the literal and intended meaning of a speaker's message. This result is in contrast to the results of past research (Beal & Flavell, 1984; Bonitatibus, 1988; Perner et al., 1988; Robinson et al., 1983; David: Care to name a few others?) which indicated that a substantial portion of 6-year-olds typically conflate what is said with what is meant. While the results of Mitchell and Russell (1989) are consistent with our findings, their results were premature for the reasons given earlier. At the same time, our results, (in particular, children's responses and justifications to the think questions), provide strong evidence

that under certain circumstances children give primacy to the speaker's intentions (what was meant) rather than the literal meaning of the message (what was said), and conflate what was said with what was meant. Furthermore, our results indicate that this occurs despite the fact that children pay attention to the speaker's message, are able to keep track of the location of the object, know the chocolate is in a cupboard other than where they claim the listener will think it is, and that they understand ambiguity restricts knowledge and that the listener will not know which cupboard the chocolate is in. Even when children are 9 years of age, there are still a substantial number who conflate what was said with what was meant.

We have argued that the most likely reason for this pattern is that the know questions do not permit children to weigh the speaker's intention with the literal meaning of the message and still give a correct response. To answer this question correctly they must give primacy to the message. On the other hand, the think question, because it can be used as an expression of uncertainty, allows children to weigh both sources of information yet still provide an answer which is at least potentially correct. When children are given this opportunity they give primacy to the speaker's intention. A bias in favour of the speaker's intention makes sense given that language is frequently marked by ambiguity and incorrect content. In order to understand what a speaker means under these circumstances children must resort to inferring the meaning that has been intended.

Finally, we might ask what accounts for the development of children's understanding that a message's literal meaning may be discrepant from the intended meaning. A large body of research has shown that around age 4 children become capable of *metarepresentation* (see the papers in Astington, Harris, & Olson, 1988). As we suggested earlier, recognizing that a message may be an insufficient source of information (and that the literal meaning may be discrepant from the intended meaning) also requires the capacity for metarepresentation. This understanding can be illustrated in two ways. First, the implicit reason the listener will not know when given the ambiguous message is that the referent of the message could be represented in either

of two ways (as the top red cupboard or the bottom red cupboard). Such a recognition is, of course, metrarepresentational. Secondly, in order to correctly answer that the listener would not know, children must judge whether the perceptual information available is sufficiently informative. Because the informativeness of information can vary widely, children cannot rely on a simple associative strategy (eg. hearing=knowing) for such an understanding. Instead, it seems they must model the process of knowledge acquisition, that is, have a conceptual understanding of how the available perceptual information results in knowledge or a lack of knowledge. Once again, we would argue that such an understanding is metarepresentational and that our results show that most 5-year-olds have attained this capacity.

Table 1

Experiment 1: The Chocolate Stories

Now that John (the listener) sees the chocolate in front of the cupboards he's going to go out to the playground. When someone is in the playground they can't see us and they can't hear us. So John can't see us and he can't hear us. Now that John is in the playground, do you know what Katy does? She takes the chocolate and puts it in a cupboard. She puts it in this *top red* cupboard (*green* cupboard in the two Unambiguous conditions, *bottom red* cupboard for half the subjects in the False Belief - Ambiguous condition). There, now I'll close all the cupboards. And then Katy goes out to the playground too. So now Katy can't see or hear us either.

Reminder 1: Which cupboard did Katy put the chocolate in?

Reminder 2: Did John see which cupboard Katy put in in?

False Belief Conditions: Now do you know what I'm going to do. Now that Katy and John can't see us or hear us, I'm going to move the chocolate. I'll move it from the top red (bottom red) cupboard and I'll put it, here, into the bottom red (top red) cupboard.

Reminder 2b: Where's the chocolate now?

Reminder 2c: Did John and Katy see us move it?

Now do you know what Katy and John do now? They come back from the playground. And when John gets back from the playground he can't see his chocolate. So he asks Katy, "Where did you put my chocolate?". Katy says, "John the chocolate is in the *red cupboard* (*green cupboard* in the Unambiguous conditions). She says, "John the chocolate is in the *red cupboard* (*green cupboard*)".

Reminder 3: How many red (green) cupboards are there?

So Katy said the chocolate is in the *red cupboard* (*green cupboard*) and there are *two red cupboards* (is *one green cupboard*).

Know Question: Does John know *which* cupboard the chocolate is in?

Know Justification: (a) Why doesn't John know?, or (b) How does John know?

So Katy said, "The chocolate's in the *red cupboard* (*green cupboard*)", and there's two red (one green) cupboard(s).

Think Question (Ambiguous Conditions): Which cupboard will John think the chocolate's in; will he think it's in the bottom red cupboard, or will he think it's in the top red cupboard, or will he think the chocolate could be in either red cupboard?

Think Question (Unambiguous Conditions): Which cupboard will John think the chocolate is in; will he think it's in the bottom red cupboard, or will he think it's in the green cupboard, or wil he think it's in the top red cupboard?

Table 2

Correct Answers to the Know and Think Questions

	Know	Think
Ambiguous Conditions	**No**	**Either**
Unambiguous Conditions	**Yes**	**Green**

Table 3

Experiment 1: Children's Ascriptions of Beliefs to the Listener Doll

		Age			
		4	5	6	Total
False Belief - Ambiguous Cond.					
	Intended	4	10	14	28
	Not Intended	2	3	6	11
	Either	0	2	1	3
Correct Belief - Ambiguous Cond.:					
	Intended	5	5	7	17
	Not Intended	1	8	12	21
	Either	0	2	2	4

Table 4

Experiment 1: Justifications Following Think Questions: Percentage of Subjects Claiming the Speaker Specified Which Cupboard

	Age			
	4	5	6	Total
Mention of Referent Without Naming (eg. "Katy told him it's in there")	--	7	--	2
Mention of Referent With Pointing but Without Naming (eg. "Katy said it's in this (pointing) cupboard")	--	7	--	2
Naming of Referent (eg. "Katy said it's in the top red cupboard")	--	20	14	14
Total				19

Table 5

Experiment 2: The Chocolate Stories

Now that John (the listener) sees the chocolate in front of the cupboards he's going to go out to the playground. When someone is in the playground they can't see us and they can't hear us. So John can't see us and he can't hear us. Now that John is in the playground, do you know what Katy does? She takes the chocolate and puts it in a cupboard. She puts it in this *top red* cupboard (*green* cupboard in the two Unambiguous conditions, *bottom red* cupboard for half the subjects in the False Belief - Ambiguous condition). There, now I'll close all the cupboards. And then Katy goes out to the playground too. So now Katy can't see or hear us either.

Reminder 1: Which cupboard did Katy put the chocolate in?

Reminder 2: Did John see which cupboard Katy put in in?

False Belief Conditions: Now do you know what I'm going to do. Now that Katy and John can't see us or hear us, I'm going to move the chocolate. I'll move it from the top red (bottom red) cupboard and I'll put it, here, into the bottom red (top red) cupboard. So I moved the chocolate from the top red (bottom red) cupboard and I put it here into the bottom red (top red) cupboard.

Reminder 2b: Did John and Katy see us move it?

Now do you know what Katy and John do now? They come back from the playground. And when John gets back from the playground he can't see his chocolate. So he asks Katy, "Where did you put my chocolate?". Katy says, "John the chocolate is in the *red cupboard* (*green cupboard* in the Unambiguous conditions). She says, "John the chocolate is in the *red cupboard* (*green cupboard*)".

Reminder 3: How many red (green) cupboards are there?

Reminder 4: Which cupboard does Katy think the chocolate is in?

Reminder 5: Did John see which cupboard she put it in?

And Katy told him that the chocolate's in the *red cupboard* (*green cupboard*) and there's *two red cupboards* (*one green cupboard*).

Know Question: So does John know *which* cupboard the chocolate is in?

Know Justification: (a) Why doesn't John know?, or (b) How does John know?

So Katy put the chocolate in the *top red* cupboard (*green* cupboard in the two Unambiguous conditions, *bottom red* cupboard for half the subjects in the False Belief - Ambiguous condition). John didn't see where she put it.

False Belief Conditions: then I moved it to the bottom red cupboard (top red cupboard for half the subjects in the False Belief - Ambiguous condition). Neither John or Katy saw me move it.

Then Katy told John that, "The chocolate's in the *red cupboard* (*green cupboard*)", and there's two red (one green) cupboard(s).

Think Question (Ambiguous Conditions): Which cupboard will John think the chocolate's in; will he think it's in the bottom red cupboard, or will he think it's in the top red cupboard, or will he think the chocolate could be in either red cupboard?

Think Question (Unambiguous Conditions): Which cupboard will John think the chocolate is in; will he think it's in the bottom red cupboard, or will he think it's in the green cupboard, or wil he think it's in the top red cupboard?

Table 6

Experiment 2: Children's Ascriptions of Beliefs to the Listener Doll

		Age			
		4	5	6	Total
False Belief - Ambiguous Cond.:					
	Intended	8	12	13	33
	Not Intended	2	0	2	4
	Either	0	1	1	2
Correct Belief - Ambiguous Cond.:					
	Intended	8	6	10	24
	Not Intended	2	5	5	12
	Either	0	2	1	3

Table 7

Experiment 2: Justifications Following Think Questions: Percentage of Subjects Claiming the Speaker Made Reference to a Specific Cupboard

	Age			
	4	5	6	Total
Mention of Referent Without Naming (eg. "Katy told him it's in there")	10	15	19	15
Mention of Referent With Pointing but Without Naming (eg. "Katy said it's in this (pointing) cupboard")	20	--	--	5
Naming of Referent (eg. "Katy said it's in the top red cupboard")	--	23	13	13
Total				33

Table 8

Experiment 3: Children's Ascriptions of Beliefs to the Listener Doll

		Age			
		5	6	9	Total
False Belief - Ambiguous Cond.					
	Intended	8	10	11	29
	Not Intended	2	1	2	5
	Either	1	1	10	12
Correct Belief - Ambiguous Cond.:					
	Intended	4	7	9	20
	Not Intended	6	4	5	15
	Either	1	1	9	11

Table 9

Experiment 3: Justifications Following Think Questions: Percentage of Subjects Claiming the Speaker Made Reference to a Specific Cupboard

	Age			
	5	6	9	Total
Mention of Referent Without Naming (eg. "Katy told him it's in there")	--	33	13	15
Mention of Referent With Pointing but Without Naming (eg. "Katy said it's in this (pointing) cupboard")	9	--	--	2
Naming of Referent (eg. "Katy said it's in the top red cupboard")	9	25	9	13
Total				30